

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In Re Application of:

Confirmation No.: 2091

Carver et al.

Group Art Unit: 3663

Serial No.: 10/795,879

Examiner: Dudnikov, Vadim

Filed: March 8, 2004

Docket Number: 61404-1100

For: **CONTAINER AND METHOD FOR STORING OR TRANSPORTING SPENT NUCLEAR FUEL**

**THIRD DECLARATION OF CHARLES PENNINGTON UNDER 37 CFR §1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

1. I possess an undergraduate degree in mathematics from Duke University, and an M.S. in Nuclear Engineering from North Carolina State University. I also possess an MBA from the University of Connecticut. I have been associated with the nuclear energy industry, both commercial and military, for 40 years. In that time, I have authored at least 50 articles and presentations for various publications and organizations relating to the storage of spent nuclear fuel and other topics relating to nuclear energy.

2. I am currently Vice President of Marketing and Business Development for NAC International, a U.S. company with a significant leadership role in the United States for the storage and transportation of spent nuclear fuel. I have also served for five years as the Director of the Nuclear Spent Fuel Academy sponsored by NAC International which is a one-week colloquium on spent nuclear fuel storage and transport offered to industry, academia, and government.

3. I am named an inventor of patents relating to spent nuclear fuel storage and transport technology involving neutron absorbers for criticality control and special canister system designs for spent fuel storage and transport, including methods for heat removal from exothermic materials. I have served as a consultant to the International Atomic Energy Agency relating to casks for spent nuclear fuel and have served as an expert witness for several utility companies supporting their Federal licensing, state approval, and litigation activities relating to spent nuclear fuel transport and storage. I have provided both closed-door and public presentations to the National Academy of Sciences and the Nuclear Regulatory Commission on the safety and security of the storage and transport of dry spent nuclear fuel.

4. I have previously led the Engineering and Design Services business unit within NAC for five years. This unit performs the design, Federal licensing, and implementation of storage and transportation systems for spent nuclear fuel. In this role, I directed development, design, and Federal licensing of storage and transport systems for spent nuclear fuel including the NAC-MPC®, UMS®, Advanced UMS®, and other systems.

5. Before joining NAC International, I served as Vice President for Technology and Business Development for Holtec International where I directed the development of technology for nuclear and hazardous material storage and transport. Prior to my employment at Holtec International, I served as Vice President for Transnuclear, Inc., where I was involved in design development, fabrication assessment, commercialization,

and marketing efforts for several spent nuclear fuel dual purpose metal casks, metal spent fuel storage casks, and other types of casks.

6. I have been made aware of the contents of U.S. Patent Application 10/795,879 entitled "Container and Method for Storing or Transporting Spent Nuclear Fuel" (hereafter "the '879 application"). The '879 application involves a storage and transport system fuel basket design for spent nuclear fuel that employs "rod and recess" technology.

7. I further have been made aware of the rejection of claims 1, 6 ,and 7 in this patent application under 35 U.S.C. §103(a) as being allegedly unpatentable over U.S. Patent 6,009,136 issued to Loftis *et al.* (hereafter "Loftis") in view of an online catalog item of Hoover Fence Company (hereafter "Hoover"). I have also been made aware of the rejection of claims 8-10, 13-34, 48-51, and 53-58 in this patent application under 35 U.S.C. §103(a) as being allegedly unpatentable over Loftis in view of U.S. Patent 4,630,738 issued to Bosshard (hereafter "Bosshard") in view of U.S. Patent Application Publication 2002/0015614 A1 filed by Lindsay (hereafter "Lindsay") and further in view of Hoover. In light of these rejections, I am providing the following information.

8. The "rod and recess" technology as referred to herein involves various elements of the claims of the above-referenced patent application. For example, among other elements, at least one of the independent claims in the present application includes an element in which rods are seated in the recesses of respective pairs of the tubes such

that the walls of the rods contact the recesses of the tubes disposed in a container. Also, at least one independent claim further recites the feature that respective sidewalls of tubes having corners engaged with each other are in "substantial alignment." These features and other elements of at least the independent claims are features of the "rod and recess" technology that result in increased capacity for the storage of spent nuclear fuel described above. Specifically, positioning the rods in the recesses results in the spent nuclear fuel being stored in closer proximity, thereby increasing the amount of spent nuclear fuel that can be stored in each container. For pressurized water reactor systems, the containers that employ the "rod and recess" design falling within the scope of the claims of the above-referenced patent application as set forth above facilitate an increase of approximately 16% in the amount of spent nuclear fuel that could be stored with a minimal increase in the weight and size of the storage containers as compared to other competitor containers available on the market. Similarly, for boiling water reactor systems, the containers that employ the "rod and recess" design that falls within the scope of the claims of the above-referenced patent application as set forth above provide an even greater increase of approximately 28% in the amount of spent nuclear fuel that can be stored with a minimal increase in the weight and size of the storage containers as compared to other competitor containers available on the market.

9. The dry storage of spent nuclear fuel usually involves placing nuclear fuel within a basket structure inside a container or canister that in turn is placed in a storage cask. The container is typically made out of metal, and the storage cask may be constructed from metal or concrete.

10. Even though containers employing the "rod and recess" technology as set forth in the claims of the above-referenced patent application hold significantly greater amounts of spent nuclear fuel, the containers can still fit within casks having the same outer dimensions as were used for the previously existing container designs. By virtue of the increased amounts of spent nuclear fuel that could be stored within the same area at a storage facility using baskets in containers employing the "rod and recess" technology, many millions of dollars could be saved by a major nuclear utility over the life of the dry storage systems if containers employing the "rod and recess" technology are used.

11. The market for systems that are licensed for both spent fuel storage and transport was primarily established from 1995 to 2000 as the United States Department of Energy (DOE) endorsed such dual use canister systems and major nuclear utilities began to employ dry storage systems for the storage of spent nuclear fuel on a large scale. Between 1995 to 2000, there were a small number of different dry storage systems available, but few if any had obtained dual use certification from the Nuclear Regulatory Commission (NRC).

12. Between 2000 and 2002, several dual use dry storage system designs were certified for storage by the NRC, having received a Certificate of Compliance issued under the General Licensing provisions of 10 CFR part 72 by the NRC. Thus, after about 2002, major nuclear utilities could purchase either certified systems or uncertified systems that were still in the NRC review process. To the best of my knowledge, no major nuclear

utility purchased an uncertified dual use system after certified systems were available in the post-2002 period.

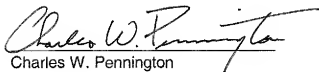
13. When dry storage systems were first embraced by the nuclear power industry, it was felt that such systems could provide a temporary holding capacity for spent nuclear fuel before it was permanently disposed of in a repository facility at Yucca Mountain in Nevada. It has now become apparent that dry storage systems will be needed for potentially two or more additional decades given what appears to be a slow pace by the DOE to license the Yucca Mountain site for disposal of spent nuclear fuel. Consequently, the benefit of increased storage capacity of the containers due to the use of the "rod and recess" technology as set forth in the claims of the above-referenced patent application has become even more attractive for major nuclear utilities.

14. On August 31, 2006, NAC received a request for proposal (RFP) from a customer that is a major nuclear utility operating multiple nuclear power plants. As set forth in this request for proposal, this customer sought to increase the efficiency of its existing dry storage of spent nuclear fuel. This customer was using an older dry storage system that had a lesser efficiency and they sought to store more nuclear fuel in a smaller number of containers and casks on their storage pad. Essentially, they wished to reduce the number of storage casks on a given storage pad while, at the same time, storing the same amount of spent nuclear fuel, thereby creating more efficient spent fuel storage capacity for future storage of additional spent nuclear fuel. Ultimately, this meant storing more spent nuclear fuel in each container used in the storage system. This customer wished to purchase a new dry storage system that provided the desired greater efficiency.

15. NAC submitted a bid to the customer to supply containers to store dry nuclear fuel that employed the claimed "rod and recess" technology that facilitates storage of greater amounts of spent nuclear fuel by 16% for this customer that operated a pressurized water reactor system as described above. At the time the bid was submitted, NAC had not yet received certification of the container design employing the "rod and recess" technology from the NRC.

16. Due to the fact that the NAC containers employing the "rod and recess" technology offered such pronounced savings in dollars per spent nuclear fuel assembly stored due to the increased storage capacity for spent nuclear fuel, the customer signed a contract with NAC for the purchase of containers employing the "rod and recess" design before certification was received from the NRC. From an industry perspective, this action represents a significant leap of faith recognizing the superiority of the design of the containers employing the "rod and recess" technology. The increased storage capacity of the containers brought about due to the features set forth as elements of the claims of the above-referenced patent application was a deciding factor in the decision to sign the contract for the purchase of the containers.

I hereby declare that all statements made herein of my own knowledge are true and that all statements are made on information and belief and are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
Charles W. Pennington

August 26, 2008  
Date